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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/666,523	09/22/2003	Luc Wolff	PET-2102	5857

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EXAMINER	
SINGH, PREM C	

ART UNIT	PAPER NUMBER
1764	

DATE MAILED: 04/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/666,523	WOLFF ET AL.	
	Examiner	Art Unit	
	Prem C. Singh	1764	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *22 September 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No._____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The drawings (Figures 1 and 2) are objected to because from distillation column (22 a) the stream from the bottom should be directed going out to join stream (19) and not coming into the column.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities:

Page 11, 4th line from the bottom should read "Styrene (23 a)" and the last line should read "column (22 b)"

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein

were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Magne-Drisch et al (US Patent 6,369,287) in view of Lee (US Patent 3,306,942).

Magne-Drisch invention discloses that the production and separation of p-xylene are carried out in industrial practice by arranging the following in a loop:

(a) process for separation of p-xylene by adsorption, whose effluents are p-xylene, on the other hand, and an aromatic C8 fraction that is substantially free of p-xylene, on the other hand. Crystallization can be combined with the adsorption stage to obtain p-xylene that is more pure (Column 1, lines 13-22). The second class of isomerization processes is known under the name of dealkylating isomerization. In this type of isomerization, ethylbenzene is converted into benzene and ethylene on catalysts with a ZSM-5 zeolite base, while the xylenes are brought into thermodynamic equilibrium. Hydrogen is also needed here to hydrogenate into ethane the ethylene that is formed (to prevent re-alkylation) and to prevent the coking of the catalyst (Column 1, lines 60-67). In industrial practice, ethyl benzene is the reaction intermediate product that makes it possible to obtain styrene by dehydrogenation (Column 2, lines 8-10). The

ethyl benzene production line is generally integrated into a plant for producing styrene and polystyrene (Column 2, lines 35-37).

Magne-Drisch invention further discloses a feedstock that is provided via a supply line (1) and comprises a mixture of p-xylene, o-xylene, m-xylene, and ethyl benzene is introduced into a first adsorption unit (2). This unit comprises chromatographic columns that are filled with an adsorbent, a Ba-X zeolite, for example, and it operates according to the principle of a simulated counter-current moving bed. Said unit comprises four chromatographic zones. A raffinate that consists essentially of o-xylene and m-xylene and ethyl benzene and desorbent is recovered via a line (3). The desorbent which is toluene that is introduced via a line (6a) makes it possible to desorb via a line (4) an extract that consists of essentially pure p-xylene and toluene that is distilled and recycled (not shown in the Figure) (Column 5, lines 9-22). The raffinate is sent via line (3) into a distillation column (5) which feeds a toluene distillate via a line (6) that is optionally recycled and a residue. The latter is introduced via a line (7) into a second adsorption unit (8) that operates as first unit (2), according to the principle of the simulated countercurrent moving bed. Said smaller second unit comprises columns that are filled with an adsorbent that contains, for example, titanosilicate. The unit comprises four main chromatographic zones. A raffinate that contains desorbent and m-xylene and o-xylene is drawn off via line (10) while an extract that contains basically essentially pure ethyl benzene and desorbent is desorbed by the toluene that is introduced via a line (12 a). This draw-off is carried out via a line (9) downstream from the line for introducing desorbent into unit (8) (Column 5, lines 23-37). The raffinate is sent into a

distillation column (11) that feeds a toluene distillate via a line (12) and a residue of o-xylene and m-xylene via a line (13). At least a portion of this residue can be introduced into a distillation unit (18) via a line (17). Said unit (18) makes it possible to recover an essentially pure m-xylene distillate via a line (19) and an essentially pure o-xylene residue via a line (20). The othe rportion of the residue is sent into an isomerization unit that operates with or without hydrogen that is introduced via a line (15). The isomerate that is collected via a p-xylene-enriched line (16) essentially contains no ethyl benzene and is mixed at line (1) (Column 5, lines 39-54). Also, preferably by a standard method that is not shown in the figure, at least some of C_9+ compounds are eliminated from the isomerate (Column 5, lines 56-59).

Magne-Drisch invention also discloses that in the first adsorption unit, it is advantageous to establish five chromatographic zones instead of four, as indicated above (Column 5, lines 60-62). The first simulated countercurrent moving bed adsorption, which makes it possible to extract p-xylene, takes place under the following conditions:

Temperature: 160°C

Number of beds: 24

Minimum pressure: 9 bar

Toluene/feedstock ratio = 1.6:1 (Column 7, lines 55-65).

The second simulated countercurrent moving bed adsorption that makes it possible to extract ethyl benzene takes pace under the following conditions:

Temperature: 160°C

Number of beds: 18

Minimum pressure: 9 bar

Toluene/feedstock ratio = 1.6:1 (Column 8, lines 16-24).

Magne-Drisch invention discloses that the ethyl benzene production line is generally integrated into a plant for producing styrene, but it does not disclose dehydrogenation step of ethyl benzene to styrene.

Lee invention discloses an improved process for the dehydrogenation of alkyl aromatic hydrocarbons such as ethylbenzene to vinyl aromatic hydrocarbons such as styrene and to an improved iron oxide catalyst therefor (Column 1, lines 9-12).

It would have been obvious to one skilled in the art at the time the invention was made to combine the inventions of Magne-Drisch and Lee and introduce a dehydrogenation step in the process scheme of Magne-Drisch and take the stream (9) consisting of 99% pure ethylbenzene (Column 8, line 26) and convert it to styrene to make the process more profitable and useful due to numerous applications of styrene.

Magne-Drisch invention does not disclose that the stream (23 b) contains styrene which is hydrogenated and the effluent conveyed to the isomerization zone.

As mentioned earlier, by combining Magne-Drisch and Lee inventions, the dehydrogenation effluents will be taken to a distillation column to separate styrene and unconverted ethylbenzene to get pure styrene. The bottoms will consist of small quantity of styrene and unconverted ethylbenzene. As mentioned earlier, one skilled in the art will take the bottoms to a hydrogenation unit to prevent coking.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Hotier et al, US Patent 5,401,476.

Bieser, US Patent 3,813,452.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Prem C. Singh whose telephone number is 571-272-6381. The examiner can normally be reached on MF 6:30 AM-3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ps/040406

Walter D. Griffin
Primary Examiner